Executive Summary

Uniform Driver Interface (UDI) Environment

PNUM 2/8

Background: In 1995, a draft UDI Environment specification was created by a commercial working group comprised of Sun Microsystems, Hewlett Packard, Digital, Santa Cruz Operations, Adaptec, and Interphase. The objective of the group was to enable communication drivers to be ported between commercial operating systems hence reduce future operating system costs. In 1996, the original working group together with IBM and NCR began local operating system implementation of the prototype UDI Environment as a precursor to final specification and subsequent UDI Environment standardization. During 1996, the Open Systems Joint Task Force (OS-JTF) together with Lockheed Martin Tactical Defense Systems (LMTDS) also initiated a parallel program to evaluate the UDI Environment concept for defense systems cost/performance effectiveness and, if warranted, support subsequent standardization activities.

To compliment OS-JTF objectives, LMTDS invested and participated in the selection of the standard, open system Scaleable Coherent Interface (SCI) (SCI-IEEE 1596) for military applications, e.g., the Next Generation Computer Resources (NGCR) High Speed Data Transfer Network working group. Currently LMTDS is investing in the development of a commercial SCI switch which has the potential to reduce next generation military system costs through the economy of scale and use of commercial-off-the-shelf (COTS) components. The prototype UDI Environment SCI driver effort couples the use of standard drivers and operating systems with next generation commercial products, e.g., workstation clusters, Non Uniform Memory Access (NUMA) architectures, etc.

Participation in UDI Standard Working Group included:

- Weekly UDI technical group teleconferences to review and debate change proposals for the draft UDI Specification.
- Two UDI Working Group meetings for planning and initiating the UDI Prototype Demonstration activity.
- Weekly teleconference technical meetings to address the UDI Prototype Demonstration effort activity and status.

SCI Metalanguage Draft Definition for UDI Specification:

- LMTDS designed and drafted a SCI Metalanguage Definition for inclusion into the UDI Specification. This SCI Metalanguage will accommodate the “draft” IEEE 1569.9 Physical Layer API for SCI. The SCI Metalanguage Definition has been forwarded to both UDI and IEEE 1569.9 Working Groups.
- Project members participated in the IEEE 1569.9 Working Group whose objectives are to define a low level, but SCI hardware independent API Standard for portable SCI software. This hardware abstraction API is expected to supports a broad range of SCI hardware implementation levels and allows for the transparent emulation of missing hardware functionality in software. LMTDS influenced the design of SCI address translation, message passing and event notification APIs.

UDI Prototype Driver Development:

- LMTDS has nearly completed development of a prototype PCI/ SCI driver as part of the UDI Prototype Demonstration activity. The driver will demonstrate communication over SCI and utilize global shared memory for transporting emulated network Ethernet data packets. The prototype SCI driver employs UDI Environment services, management, bus/bridge, and network metalanguages.
- LMTDS has staged a workstation for driver development and UDI Prototype Demonstration activity. This unit includes PCI/100 BaseT, PCI/SCSI, and PCI/SCI adapter boards and operates with the UDI Prototype UDI Environment.
- The UDI prototype driver development efforts have proven beneficial in firming the UDI Specification requirements by exposing numerous instances of interface inconsistencies and identifying needs for functional behavior enhancement.

UDI Benchmark Development:

- Military system driver performance requirements were collected from the following military systems:
  - ASUW Improvement Program (AIP),
  - Q-70 Advanced Display System,
  - Light Airborne Multi-Purpose System Helicopter (LAMPS), and
  - C-130 Combat Talon II.
- LMTDS has recommended that the requirements be used as benchmarks for the prototype UDI Environment in preparation for UDI Environment standardization.
- The requirements are summarized in a document entitled "Uniform Driver Interface (UDI) Environment Requirements Specification".

Department of Defense Progress Presentations:

- During 1996-97, LMTDS presented UDI Environment objectives and our evaluation accomplishments to the following DoD organizations/programs:
  - Army's Weapon System Technology Architecture Working Group (April 2, 1997) and
  - Joint Strike Fighter (JSF) Open System Architecture Meeting (May 6, 1997).

FY98 Tasks:

- **Complete Prototype Driver Development:** Complete code, integration, and checkout of the prototype PCI/SCI networking driver.
- **Demonstrate Portable Drivers Operating in UDI Environment:** Participate in the UDI Prototype Demonstration efforts. This includes participation in the consortium internal prototype UDI Environment demonstration in FY97/Q4, followed by another demonstration thereafter at an industry related conference/trade show. Separately, LMTDS will stage equipment for demonstrating operation of the prototype SCI driver on heterogeneous platforms.
- **Participate in UDI Standardization Effort:** Participate in the UDI Specification development effort to: 1) facilitate moving this work under a standards body sponsorship (sic. IEEE or OSF), 2) assist in the further refinement of the UDI specification, and 3) seek consensus approval of UDI requirements. Promote features that enable the UDI technology to meet weapon systems I/O and backplane interconnect performance requirements.
- **Model/Simulate UDI Environment (Optional):** Establish a simulation model of the UDI environment along with traffic generators for driving the model. This will aid defense industry participants in making objective decisions related to the performance impact of proposed changes to the draft UDI specification.